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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

CHEN, TIANJIE

ART UNIT

PAPER NUMBER

2652

DATE MAILED: 07/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/943,859

Applicant(s)

SIN ET AL.

Examiner

Tianjie Chen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12, 14-17, 19 and 20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12, 14-17, 19 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

2nd Non-Final Rejection

1. The indicated allowability of claims in Office action mailed on 03/23/2005 is withdrawn in view of the newly discovered reference(s) to Redon et al (US 6,381,107). Rejections based on the newly cited reference(s) follow.

Claim Objections

2. Claims 6 and 11 is objected to because of the following informalities:
 - In claim 6, line 8; "the first hard" should be changed to --the hard--, and "a first gap" should be changed to --the first gap--.
 - In claim 11, at the end of line 4; "a" should be changed to --the--.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 2, 6, 7, 11, 12, 15-17, and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Redon et al (US 6,381,107).

With regard to claims 1 and 11, Redon et al shows a hard bias spin-dependent tunneling sensor and a method of manufacturing in Fig. 1 including: a first lead 81 (Column 5, lines 3-4); a first gap spacer 71 (Column 5, lines 41-42) adjacent the first lead; a hard magnet 61 (Column 8, lines 52-54) over the first lead, the hard magnet

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formed around and in contact with the first gap spacer 71; a free layer 20 (Column 4, line 42) over the hard magnet 61; a tunneling barrier layer 30 (Column 4, line 41) over the free layer; a pinned layer 40 (Column 4, line 43) over the tunneling barrier layer; the pinned layer includes a first pinned layer 41 (Fig. 9; column 8, lines 16-21), a nonmagnetic coupling layer 42 over the first pinned layer; a second pinned layer 43 over the nonmagnetic coupling layer; a pinning layer 50 (Column 4, line 53) over the second pinned layer; and a second lead 85 (Column 5, lines 3-4) over the pinning layer.

With regard to claims 6 and 16, Redon et al shows a hard bias spin-dependent tunneling sensor and method of manufacturing in Fig. 1 including: an inherent substrate; a shield/first lead 81 of a conductive material over the substrate; a first gap spacer 71 adjacent the shield/first lead, a hard magnet 61 made of CoPt containing Pt formed over the shield/first lead, the hard magnet is formed around and in contact with the first gap spacer 71; the first a free layer 20 of NiFe (Column 7, lines 16-20) containing iron and nickel formed over the hard magnet, a tunneling barrier layer 30 made of alumina (Column 7, lines 66-67) containing aluminum formed over the free layer, a nonmagnetic coupling layer 42 containing Ru (Column 8, lines 9-11) formed over the first pinned layer 41, a second pinned layer 43 made of NiFe (Column 8, lines 9-11) formed over the nonmagnetic coupling layer 42, a pinning layer 50 made of RuReMn (Column 11, lines 29-30) containing Mn formed over the second pinned layer 43, a shield/second lead 85 of a conductive material formed over the pinning layer.

With regard to claims 2, 7, 12, and 17, Redon et al further shows a first gap spacer 71 made of nonmagnetic and conductive material Ta (Column 11, line 34-35) over the first lead 81; and a second gap spacer 75 made of nonmagnetic and

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conductive material Ta over the pinning layer 337. Redon et al discloses the thickness of 71 and 72 is between 100-500 Å (Column 5, lines 61-62), layer 30 is between 5-20Å (Column 8, lines 1-6), layer 40 is between 10-100 Å (Column 7, lines 28-29), and layer 50 is between 60-300 Å (Column 7, lines 37-38). It shows there are various combination of thicknesses, which include a case, wherein the free layer 20 is equally spaced from the first and second leads. As an example, layer 71(500 Å)/layer 30(20 Å)/layer 40(20 Å)/layer 50(60 Å)/layer 75(400 Å).

With regard to claims 15 and 20, Redon et al further an insulator 93 over the hard magnet 61 and around the free layer 20, the tunneling barrier layer 30, the first pinned layer, the nonmagnetic coupling layer, the second pinned layer, and the pinning layer.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 3, 4, 5, 8, 9, 10, 14, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Redon et al in view of Khan et al (US 6,495,311).

With regard to claims 3 and 8, Redon et al's method includes: forming first gap layer; and forming the hard magnet includes forming the hard magnet around the first gap spacer.

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With regard to claims 5 and 10, Redon et al's method includes: forming the free layer, the tunneling barrier layer, the first pinned layer, the nonmagnetic coupling layer, and the pinning layer; and including: forming an insulator over the hard magnet and around the free layer, the tunneling barrier layer, the first pinned layer, the nonmagnetic coupling layer, the second pinned layer and the pinning layer for as an enclosure of the device.

Redon et al does not show that bilayer process is used in the methods.

Khan shows a method of manufacturing magnetic head, wherein bilayer process is used in manufacturing (Column 2, lines 45-49).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to use bilayer process in Redon et al's method of manufacturing. The rationale is as follows: Khan et al teaches that the bilayer process can be used to form a clean edge for the layer deposited (Column 2, lines 45-49). One of ordinary skill in the art would have been motivated to use bilayer process to obtain a clean edge for the layers.

Claims 4, 9, 14, and 19, in the above constructed device, the bilayer process can also be applied to forming the hard magnet, the seed layer would be formed in the recess of the first lead (See Fig. 1 in Redon et al).

Response to Arguments

5. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tianjie Chen whose telephone number is 571-272-7570. The examiner can normally be reached on 8:00-4:30, Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa Nguyen can be reached on 571-272-7579. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


TIANJIE CHEN
PRIMARY EXAMINER